

We Claim:

1. A passive acoustic liner system for attenuating a sound field comprising, in acoustic series, a mode-scattering
5 segment and a sound-absorbing segment, wherein the mode scattering segment provides a reactance between -12 and $-2 \rho c$ and the sound absorbing segment provides a reactance between -1 and $0 \rho c$ thereby providing a reactance discontinuity such that mode-scattering of the sound field
10 enables the sound-absorbing segment to further absorb the scattered sound.
2. A passive liner system as claimed in claim 1 wherein the difference in reactance between the sound-absorbing segment and the mode scattering segment is achieved by a difference
15 in thickness of the segments.
3. A passive liner system as claimed in claim 1 wherein the thickness of the sound absorbing segment is at least twice the thickness of the mode scattering segment thereby providing the reactance discontinuity capable of mode-
20 scattering the sound field so that the sound-absorbing segment further absorbs scattered sound.
4. A passive liner system as claimed in claim 1 wherein the thickness of the mode scattering segment is between 10% and 50% of the thickness of the sound absorbing segment.
- 25 5. A passive liner system as claimed in claim 1 wherein the thickness of the sound absorbing segment comprises a thickness between 20 mm and 50 mm and the thickness of the mode-scattering segment is between 5 mm and 10 mm.
6. A passive liner system as claimed in claim 1 wherein the
30 mode-scattering segment and the sound-absorbing segment comprises a porous face sheet, a layer of cells and an impervious sheet, the porous face sheet exposed to the sound field.
7. A passive liner system as claimed in claim 1 wherein the
35 difference in reactance between the sound-absorbing segment

and the mode scattering segment is achieved by the mode scattering segment comprising a porous material.

8. A passive liner system as claimed in claim 7 wherein the porous material comprises any one or more from the group
5 comprising a fibrous material and a foamed material.

9. A passive liner system as claimed in claim 1 wherein the sound-absorbing segment comprises a length between 2 and 10 times the length of the mode-scattering segment.

10. A gas turbine engine comprising a passive liner system
10 as claimed in claim 1 wherein the engine further comprises a duct through which the sound field emanates and the passive liner system is disposed to the radially inner wall of the duct.

11. A gas turbine engine as claimed in claim 10 where in
15 the duct is any one of the group comprising an exhaust nozzle or an intake and a bypass duct.